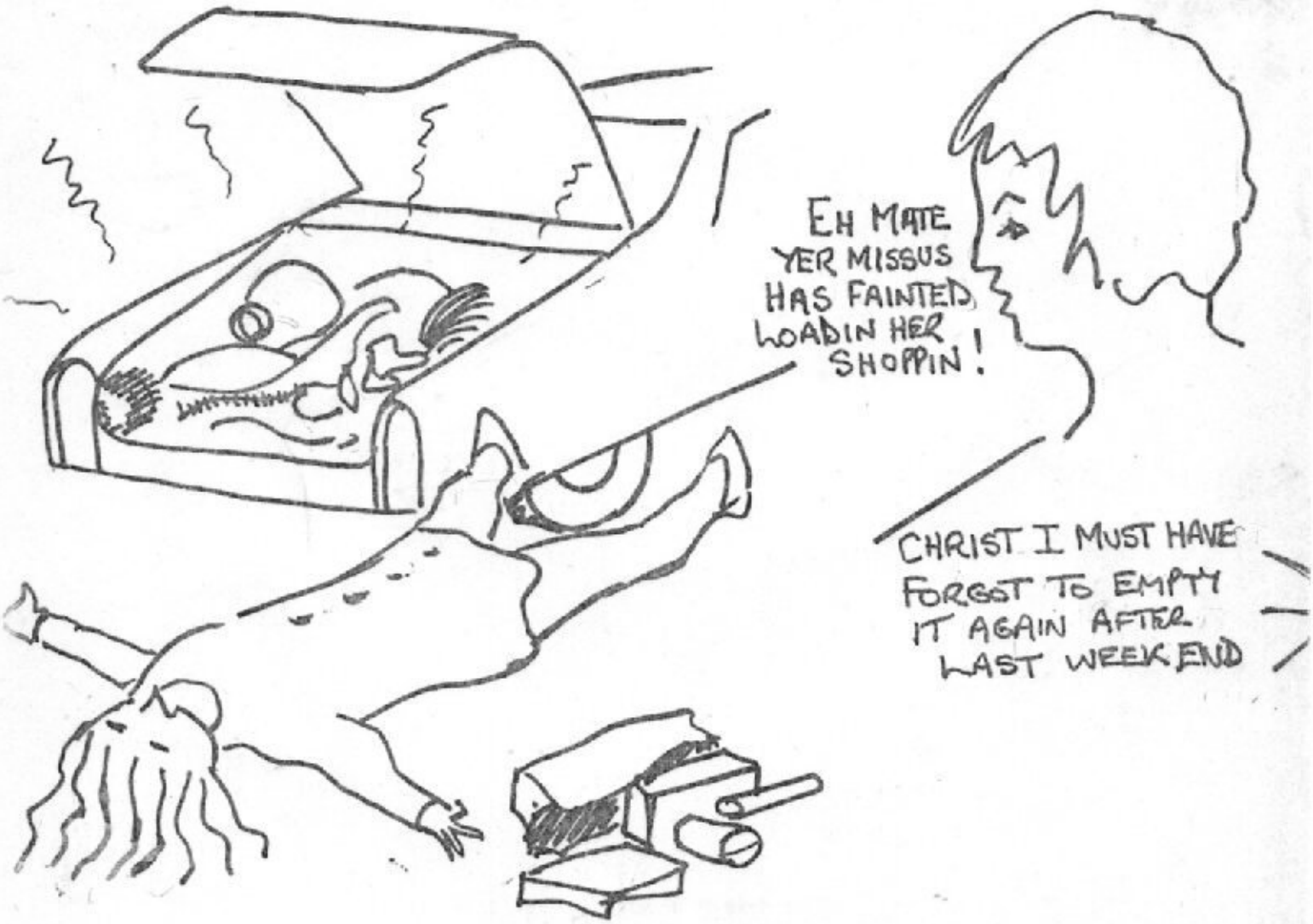
Chris

EARLY 1985

# C.C.P.C.

## Newsletter No. 8




THE CLUB "DO" TAKES PLACE ON SATURDAY MARCH 22ND AT THE OUT OF TOWN IN HANLEY. OUR D.J. WILL BE CLIFF, WHO WILL ALSO BE INTRODUCING NOMINEES FOR THE FAVOURITE EVENT OF THE EVENING - THE "WALLY AWARD". THERE WILL ALSO BE A PHOTOGRAPHIC PRINT COMPETITION (ANY SIZE OF PRINT MAY BE ENTERED.) TICKETS WILL BE £4 APPROX. - WHICH INCLUDES THE BUFFET.

## 9TH INTERNATIONAL SPELEOLOGICAL CONGRESS - SPAIN '86

Money at the ready folks. (Hi Melvin whatcha doing tonite ?) It's time to go on a summer holiday to Spain. Fortunately I've left this news rather late so it's too late for any of you to don cap and gown and present a paper or two for discussion there. However - here's a brief summary of events. (Figures based on 220 Pts to the £)

1) Symposium on Cave Rescue Madrid July 24-30
Discussions etc. will be interpreted into English (and French too John!)
Accommodation in Madrid suits all pockets from hotels to hostels and camp sites.
There will be five simulated rescues 26-29th July in Cuenca and Guodalajara so take your own gear, then back to Madrid for the closing session.
Cost. 15000 pts (£68) inclusive of coach transfers twixt "activity" ie. rescue areas and Madrid.
Cost. 4000 pts (£18) for Madrid session alone.

2) Excursion round Larra Piedra de San Martin (PSM) Stay in Pamplona. Arrive 26 July.
Equipment needed - mountain footwear, helmet and light.
Visits; July 27. Pyrenean Karst, San Jorge System.
July 28. Various Karst regions.
July 29. Kakouetta Canyon. Bentia, Illamina, Kakouetta Springs.
July 30. Verna Room PSM (via tunnel).
July 31. Barcelona closing session.
Cost. 28000pts (£126) (breakfast, lunch and coach transfers inclusive).

3) P S M August 8th - 13th.

4) Underground Camp Including tourist trip to fossil footsteps of a dinosaur! 10 Aug.
Barcelona to Ojo Guarena cave system. 13-16 August.
Caving gear needed.
Cost. 18000 pts (£82)
During the camp, tourist excursions for non-cavers will be arranged daily.

5) Volcanic Cavities Camp (Islas Canarias) 9-17th August.
This seems the most outstandingly interesting event.
Cost. 55000 pts (£250) Price includes hotel accommodation and breakfast in Tenerife and Lanzarote. Other meals not included.
Four cave visits and one climb are on the agenda and various tourist trips.

6) Prehistoric Routes 10-17th August.
Each day is spent underground and at the end of each visit there will be comments and discussions with prehistorians specialised in each cave.

7) 5th International Speleological Film Festival 1-7th August.
Sessions start 8 pm.

Further details from Ralph!

"1"

# Batteries by Ian Copeland.

## What is a battery ?

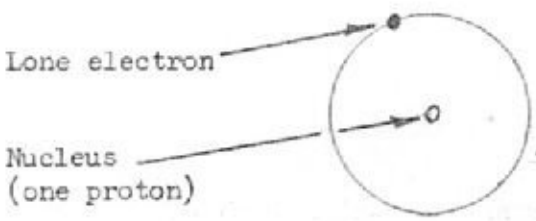
Batteries are electrochemical devices which are widely used to supply energy for electrical and electronic products. Chemical Energy stored in a battery is converted into electric current when the battery is discharged. This electric current is produced directly by chemical reactions which occur within the battery. Basically two dissimilar metals, kept electrically isolated by a separator which is permeable to ionic flow. The quantity of electric energy made available is a function of the inherent potential and efficiency of the electrochemical reactions, as well as of the amount of active material in a battery. The reaction between the two metals takes place by means of ionic exchange, usually via an electrolyte; eg. the mixture of water and acid in a car battery. The electrolyte may be acid or alkali and may be in the form of jel, paste as well as liquid, often it is absorbed into the separators so that no free electrolyte remains.

Many combinations of chemicals have been tried, with varying degrees of success, as energy storage systems. Each type of battery has advantages and disadvantages with regard to its physical and electrical characteristics. Energy density, expressed in watt-hours per unit mass or watt-hours per unit volume and Power capabitity in watts per unit mass or watts per unit volume are two important measures of merit for a battery.

## How a cell works ?

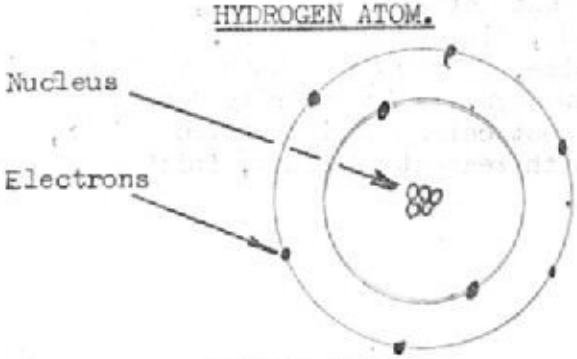
### Atoms.

All matter consists of atoms, they are the basic building blocks. Each consists of a central nucleus containing protons and neutrons and one or more concentric shells of electrons orbiting the nucleus at predetermined distances. Whilst it is the nucleus which determines the nature of the element it is the electrons which are involved in all normal chemical reactions. The simplest atom of all is Hydrogen. It consists of a single proton, which is postively charged and a single electron, which is negatively charged. As the two charges cancel, the atom is electrically neutral.




HYDROGEN ATOM.

One of the most important elements is Oxygen. It consists of a nucleus which contains 8 postively charged protons and a number of 'neutral' neutrons. Around the nucleus orbit a total of 8 negatively charged electrons. Two in the inner shell and 6 in the second, outer shell. The optimum compliment of electrons for this shell is 8, so the atom is not particularly stable.

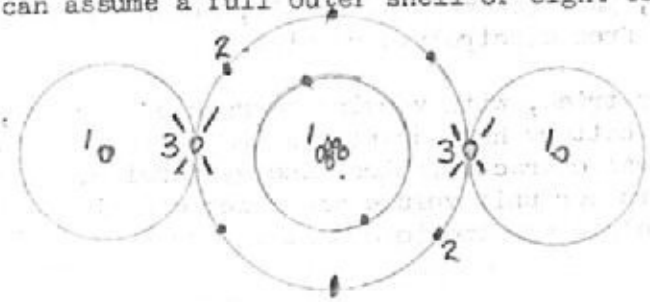



OXYGEN ATOM

Compounds.

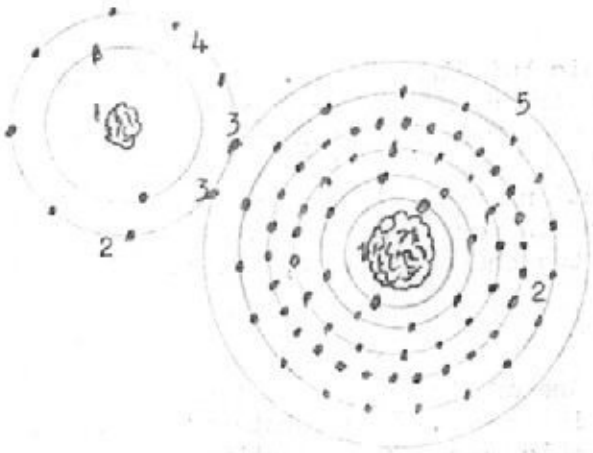
Nearly all elements have a tendency to combine with other elements to form compounds. Elements with a full outer ring of electrons do not normally combine in this way and so are considered inert or unreactive. Examples are Helium, Neon and Agron. Elements with nearly empty outer shells are reactive and quickly combine with outer elements.

When elements combine they do so in such a way that the atoms involved can by sharing electrons assume full outer shell configurations. One example of this, water, where two Hydrogen atoms combine with an Oxygen atom. The oxygen atom 'borrows' the electrons from the Hydrogen atom and so, with its six electrons can assume a full outer shell of eight electrons.




1. Nucleus
2. Electrons
3. Electrons from each Hydrogen atom sharing with Oxygen atom

WATER MOLECULE.



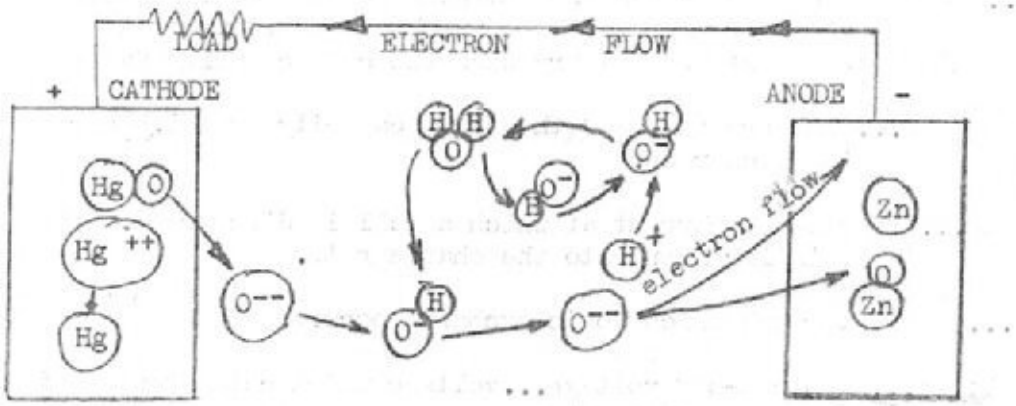

1. Nucleus
2. Electrons
3. Two electrons in outer ring of Mercury atom sharing with Oxygen atom
4. Oxygen atom
5. Mercury atom

MERCURIC OXIDE COMPOUND MOLECULE.

All metals have an affinity for Oxygen, the strength of which varies from element to element. It is possible, therefore, to construct a 'league table' of metals based on the strength of their affinity for Oxygen. This table is known as the 'Electromotive series'. The lowest metal in the table, with the weakest affinity is Gold, followed by Platinum, Silver and Mercury. This is the reason why Gold takes many years to oxidise, Silver only months and Iron, which is much futher up the table, only a few days. It is affinity for Oxygen which forms the basis of battery operation. Most cells consist of two metals, usually well separated on the 'table'. One with weakest affinity, initially oxidised, whilst the other in it's pure form.

How they work.

The diagram illustrates the workings of a Mercury Zinc cell. The cathode (+) plate initially consists of Mercuric Oxide, HgO, molecules. The Mercury atoms have a valency of 2, two electrons on the outer shell whilst the Oxygen atoms have a valency of 6. They combine to form a stable compound with 8 electrons on the outer shell. However, the Oxygen is attracted towards the Zinc which has a greater affinity for Oxygen. The Oxygen is attracted towards the Zinc from the Mercury atoms, taking with them the two electrons from the Mercury Thus the Oxygen atoms have two extra electrons and become an 'ion'.Meanwhile the Mercury is left with an excess of protons and become an 'ion' too.




The Oxygen(--) ion, on entering the electrolyte immediately encounters a water molecule.Because of it's strong negative charge,the Oxygen ions attracts a proton,the nucleus from one of the Hydrogen atoms. The resulting molecule is known as a hydroxyl ion and carries a single negative charge.The act of tearing the proton from the water creates another hydroxyl ion as a single hydrogen electron is left behind giving a net single negative charge.Both these ions migrate to the zinc anode as both contain oxygen.

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When one of the hydroxyl ions reaches the anode,theoxygen combines with zinc.For this to happen,it first sheds the hydrogen proton,which almost immediately encounters another hydroxyl ion. Since the ions is negatively charged and the proton postively charged the two are attracted and combine to form water molecules, replacing that split when the oxygen left the cathode.The oxygen combines with the zinc to form zinc oxide.The molecule has a surplus of two electrons which are released into the anode.

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The net effect is that oxygenflows from cathode to anode whilst electrons flow from anode to cathode. Water takes an active part in the operation of the cell but there is no net change in the amount of water.If no external circuit is complete, the above situation cannot continue for long. Quickly the anode builds up a surplus of electrons, a negative charge, repelling any futher hydroxyl ions. Meanwhile the cathode aquires a positive charge, attracting hydroxyl ions and preventing them from migrating towards the anode. However, if an external circuit exists; the electrons can flow through the circuit back to the cathode where they can combine with the positive mercury ions to form neutral Mercury.

Terminology.

One of the frequent sources of misunderstanding is the jargon used within the battery industry. Few people outside the industry understand the difference between a cell and a battery. Luckily in most situations the difference is merely academic, however there are occassions when it can be important to distinguish between the two .....

Cycle... One complete discharge of a cell or battery, to a certain end point voltage, and recharge to it's fully charged state.

Cycle Life...The total number of cycles obtainable from a cell or battery before failure occurs. Failure can be complete as with a cell which goes short or arbitary when the cell capacity falls to 80%.

Depth of Discharge...The percentage of the rated capacity by which a cell is discharged.

Discharge Rate...The rate of current at which a cell is discharged. Expressed in a similar manner to the charge rate.

Electrolyte...Medium through which ionic exchange occurs.

End point voltage...also cut-off voltage...voltage which cell should not be discharged further.

E.M.F....No lead voltage across cell.

Energy Density...Ratio of cell energy to weight or volume.

Float Charge...Maintaining a fully charged state within a cell by a slow constant charge.

Internal Impedance...Opposition of a cell to direct current flow causing the actual on load output voltage to be less than the e.m.f.

Nominal Voltage...Approximate voltage of a cell when discharged under certain defined conditions.

Primary...A cell or battery not intended to be recharged.

Nominal Capacity...Expected capacity of a cell, when discharged under defined conditions.

Secondary...A cell or battery that can be recharged.

Self Discharge ...A flow of current within the cell causing loss of energy.

Separator...The ionic permeable but electrically insulating material that prevents direct contact between the plates or electrodes.

Shelf Life...(i)For a primary cell is the length of time from manufacture before its remaining capacity falls to a certain level if stored under specified conditions.
(ii)For a secondary cell is the length of time after manufacture before the cell will not meet its specified rating when stored or not cycled under certain specified conditions.

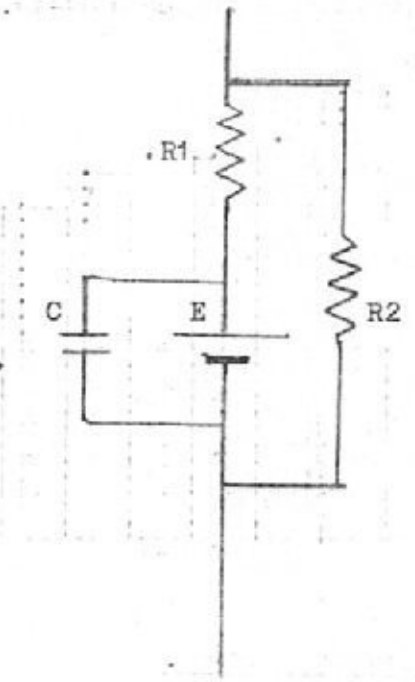
Trickle Charging...Continous or intermittent low rate charging to maintain a cell or battery at a high state of charge.

## Circuit of a cell.

The diagram represents the first order equivalent circuit of a cell which is adequate for most purposes.
E is a theoretical cell, output equal to e.m.f. of the couple at the appropraite temperature.
RI represents the internal resistance of the cell, This is the main reason why the output voltage of the real cell falls as the current increases. It's value can be between milliohms to tens of ohms. Also the value will vary with temperature, age etc.

R2 represents the discharge paths which are responisble for the gradual loss of stored capacity of the cell. The value is inversely proportional to the temperature so cells should be stored under coolconditions.

Since all cells consist of two conductive plates insulated from each other by a dielectric material they will behave as a capacitor.

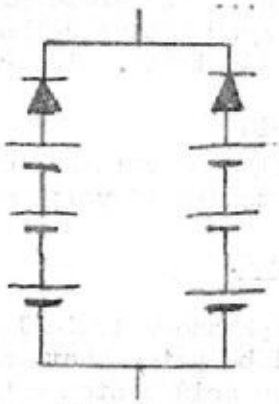



## Series and Parallel.

It is posible to connect cells or batteries in series or parallel to obtain greater voltages or capacity. However, it should be remembered that the greater the number of cells in use, the greater the chance of a failure. Secondly, some battery systems should not be connected in parallel without the use of protection diodes to prevent circulatory currents. (as for nicad).


A cell
voltage V
capacity C


3 cells connected in series to form voltage 3V and capacity C

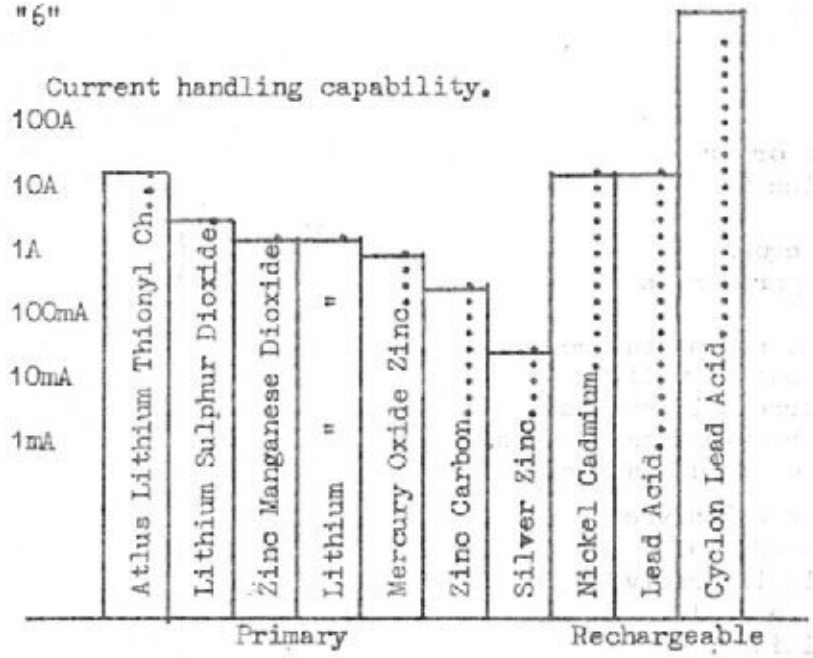


2X3 cell battery connected in parallel voltage 3V-Vo Capacity 2C
Vo is forward voltage drop across diode.

## Current handling capability.

The ability of a cell to supply a particular current will depend on several factors. Firstly, some systems are inherently better to supply heavy currents. Temperature also affects a cells ability to deliver current. Most types ability to produce current falls with reducing temperature. Compare with the fact that Self discharge will increase with temperature. This is the reason why cells should be stored in a cool place.

"6"




Secondary Systems.

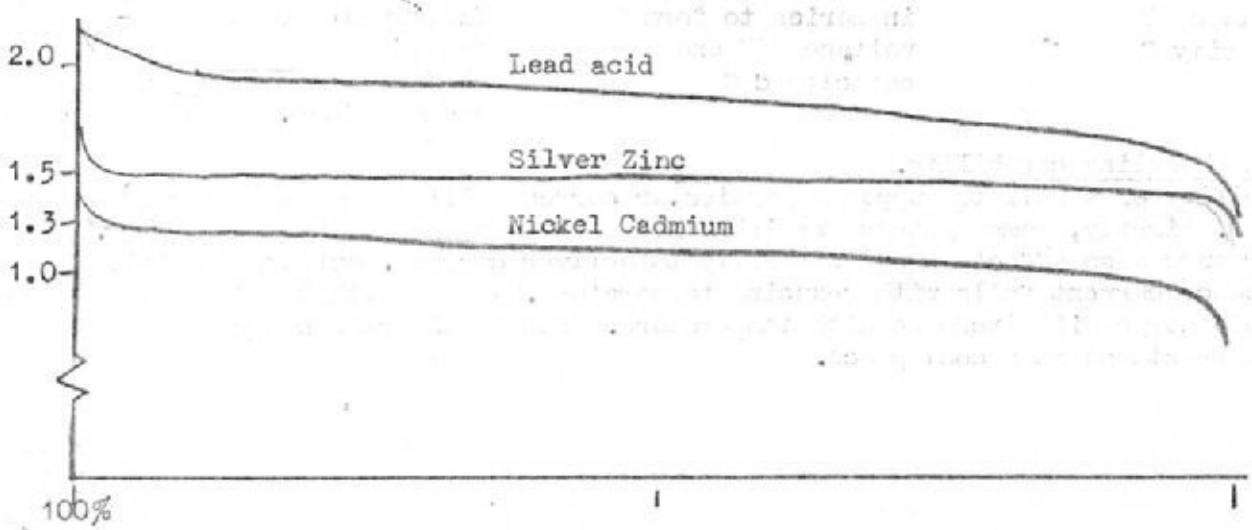
Silver Zinc
A 1½ volt system which offers the best energy density of any commercial secondary battery. Best suited to low current applications within a temperature range of -10 to +40°C.

Nickel Cadmium.
A 1.2 volt system available in a very wide range of sizes. There are three types of NiCad...Mass plate button cells are best suited to low/medium current application Multi-layer Button cells are capable of high current use and have superb long term reliability. Sintered cylindrical cells, capable of very high currents.

Lead Acid
Basically a 2 volt system, however can be obtained in multiples of 2 volts, ie 6volts and 12 volts and capacities to many hundreds of ampare hours.

Discharge.

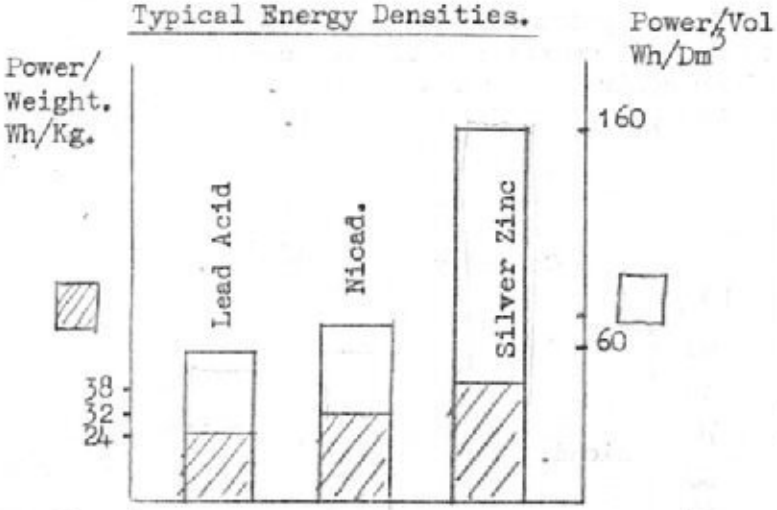
The graph shows typical discharge voltage profiles for the three systems. It will be noted that the silver zinc exhibits a very flat profile while the lead acid system exhibits an almost constant slope.



Energy Density.

Typical energy densities for three systems. It will be noted that the silver zinc has over twice the power to volume ratio of nickel cadmium. In a companion between cells of equal size, the lead acid system would have figures considerably below the nickel cadmium.

Typical Energy Densities.

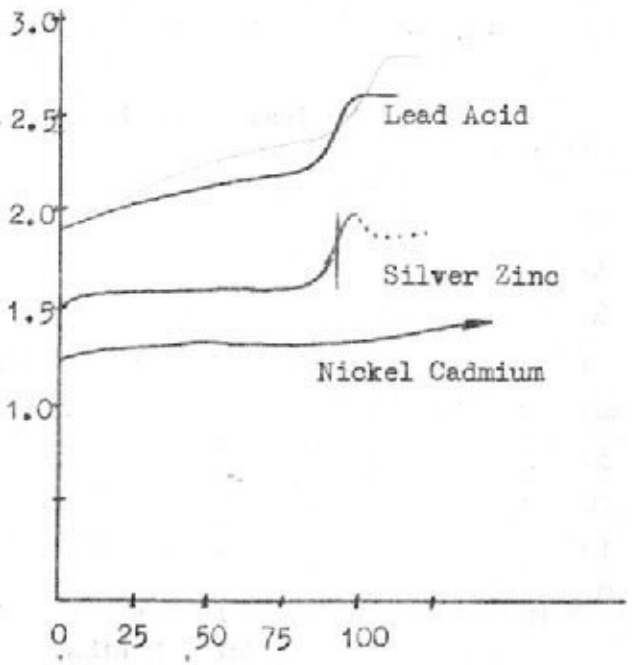



Silver zinc and Lead acid cells are most effective at low to medium discharge rates,ie rates to C/3. This is due to their high internal resistance and low leakage values. Nickel Cadmium types on the other hand are generally capable of good high rate performance. For the sintered cells discharge rates of 10C are considered normal and short duration current of more than 100C are possible.

Charging.

Correct charging procedures are vital to the performance of secondary cells or batteries. If incorrect methods are used, then poor capacity during discharge will be the result. In many cases the cells will be damaged and in extreme cases catastrophic failure will occur .

The figure shows typical voltage profilies of three systems during recharge at room temperature.
Because of the increase of voltage at the end of charge, silver zinc and lead acid systems can be charged from constant voltage chargers. Alternatively constant current chargers with voltage limiters may be used.




Lead acid charging.
In an application where a constant float charge is to be used, a constant potential charger with an output of 2.25 volts per cell can be used. In cyclic applications, the potential should be between 2.45 and 2.50 volts per cell. In applications where the discharge at each cycle represents only a small portion of the nominal capacity a constant current charger with voltage limiter is preferable since this reduces the repeated overcharging on each cycle. For operation the voltage should be set to 2.45 volts per cell ±0.06v
The current should be set between C/10--C/5.

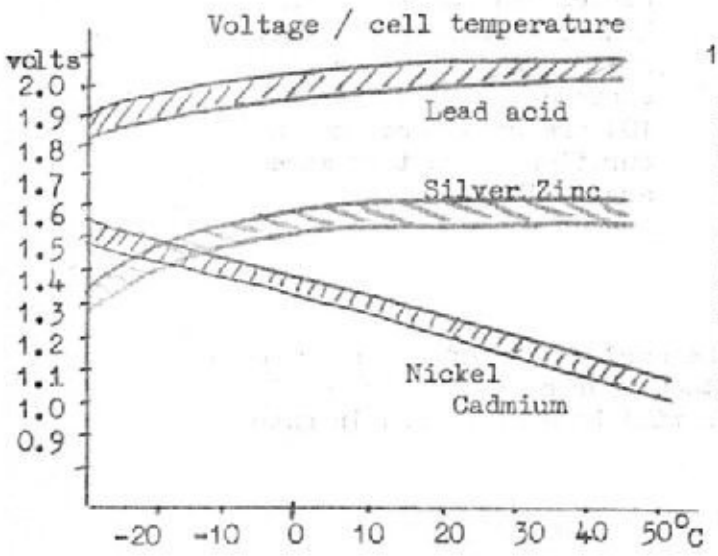
Nickel Cadmium Charging.

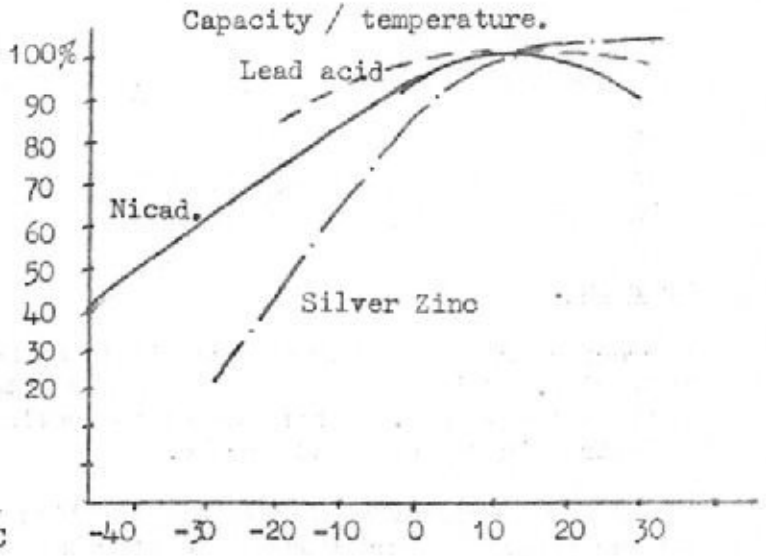
Because of the flat characteristics of nicel cadmium cells during charge, constant voltage chargers cannot be used. Constant current chargers are essential as nickel cadmium cells and batteries have a negative temperature co-efficient. Since the cells warm up due to gas recombination, at the end of charge, constant current chargers are necessary to avoid thermal runaway.

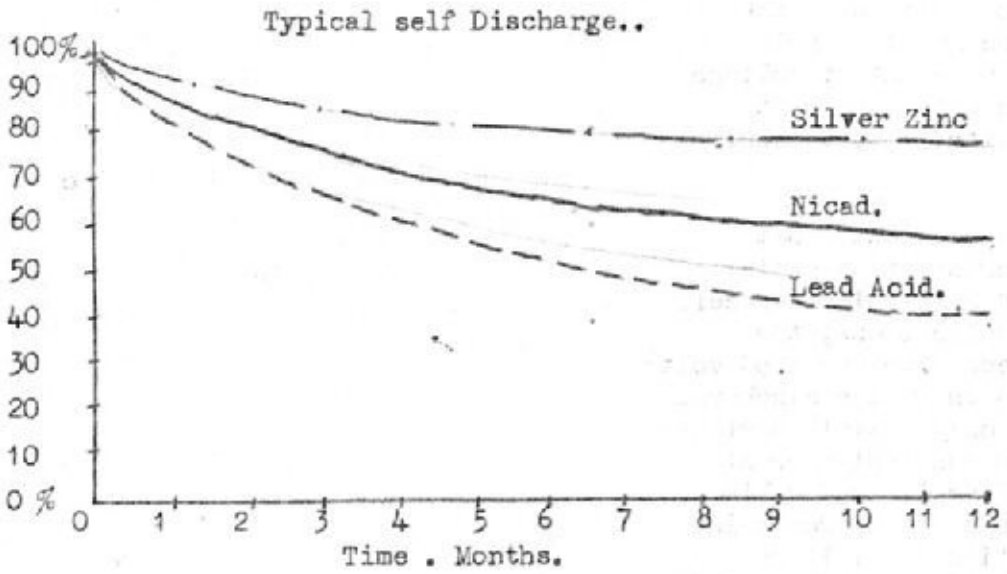
Cylindrical Cells.

The normal charge rate for cylindrical nicad. cells is C/10 for 14-16 hours irrespective of the initial state of charge. In fact, cells will withstand overcharce at this rate for prolonged periods. However, in applications where cells are left permanently on float charge, rates between C/20 and C/200 should be used.
It is posible to charge cells and batteries at rates much faster that those above. However, more care is needed to prevent damage due to over charge and it is strongly recommended that timer control chargers are used.
Only fully discharged cells should be charged using timed chargers.

Below are some useful graphs.....



## MINUTES OF THE D.C.A.

You'll all be pleased to know that the D.C.A. are quite satisfied with our work on Oxlow over the past few months. Ralph has received a letter thanking everyone for their efforts.

Access to Ashwood Marble Mine is being negotiated at present. It seems that the N.C.C. are prepared to allow cavers to visit if;

(i) a padlocked gate is fitted and the key placed with a nominated custodian.
(ii) reasonable notice is given.
(iii) monthly inspection by an experienced person is carried out.

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Cliff advises us that our method of fastening ladders when coiled is definitely OUT. Most repairs undertaken at Caving Supplies are due to this type of fastening. Cliff suggests stuffing the ends into the coiled ladder. Any comments please?

Ralph has in his possession a users guide to the Petzl Stop descender. I strongly recommend that read it if you use the "Stop", as more than one accident has occured through incorrect operation.

At the A.G.M. in 1985 we reorganised the tackle to include a small store at Cliff's house in Buxton. The reason for this was to allow people such as myself to do a trip in Derbyshire without the inconvenience of travelling to Ralph's for gear. Cliff recently told me that nobody other than himself has used the tackle over the past 12 months, the reason being that most people have forgotten it's there. So if you have an overwhelming desire to do P8, Giants etc and find Ralph's or Kevin's out of the way, call at Cliff's house.

The British Association of Caving Instructors is running a number of courses this year which includes the following:-
Single Rope Techniques, cave leadership (in 2 parts), underground navigation and pitch rigging for S.R.T. If anyone is interested in any of these and would like more details see Paul Shenton.

Paul Deakin (who?) is hosting a slide show on March 8 at The Biddulph Arms, slides to include the Berger and others. Admission £1 - proceeds to C.R.O.

STOP PRESS

Bourne Sports currently have a sale of Helly Hansen thermal underwear.

## T'OWD MON IN TROUBLE... CRACK RESCUE TEAM SENT IN !!!!

Some one said TR was "loosing his grip" despite demonstrations to the contrary at a recent meeting but the refer€ace was to his route finding not his bionic handshake !!! On a recent Pipikin-Link trip this intrepid explorer of days gone b y managed to get himself and his merry band of followers LOST! Fortunately two of the clubs (Possibly the countries) leading cavers (who wish to remain anonymous) were on hand to assist. The decrepit old codger and his Sorry band were soon located and led to safety by our two anonymous heros !!!

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## IS IT YOUR TURN NEXT? A comment from P.Ton.

We have had three close shaves recently as detailed below, make sure that the next incident doesn't involve you, and if it does you are able to cope with the problem. Sods' Law states that 'If it can go wrong it will do so at th e worst possible moment.' We all know that there is no substitute for experience but before you old_uns get too smug, familiarity breeds contempt.

1. Jane managed to become marooned 10m. down the 210 due to a long chinstrap becoming caught in her rack. In the past members have caught all sorts of odds and ends in descenders often with potentialy dangerous possibilities.

2. Derek managed to detach himself from his gear 20' up the 210 during a 'change over', due by all accounts to not fastening the screw on a krab. To those who havent seen the trick performed, it is quite easy to remove a descender from a krab even under load and this has led to the death of at least one well known and very experienced climber.

3. An incident took place in Diccan involving a non member on a club trip. To cut a long story short, always carry your own prussiking gear on a 'Thro' trip', you might have to make an unscheduled exit and someone elses gear might be unavailable or unsuitable!!! In somewhere like Diccan you could easily die of exposure.

EXTRACTED FROM CAVES OF STAFFORDSHIRE VOLUME 2B - HULME AND WERRINGTON.

RON BECKETT'S BARN

Grade I - V
Depending on weather

Location: Turn towards Hulme from Ash Bank Garage. Obvious barn 200 yards from junction.

Description: A very interesting system with many alternative routes. Scale fixed ladder to obvious beams in roof. From here there are many alternatives to the Big Pitch (20') - a fantastic free hang in space landing on an unusual 'concrete' false floor. Possibly the best trip in Staffordshire.

WARNING: Beware of geese in extremely dry weather as they are easily irritated. Cave also floods to roof in very wet weather.

Permission: Not normally needed from Ron Beckett - just turn up - the earlier the better.

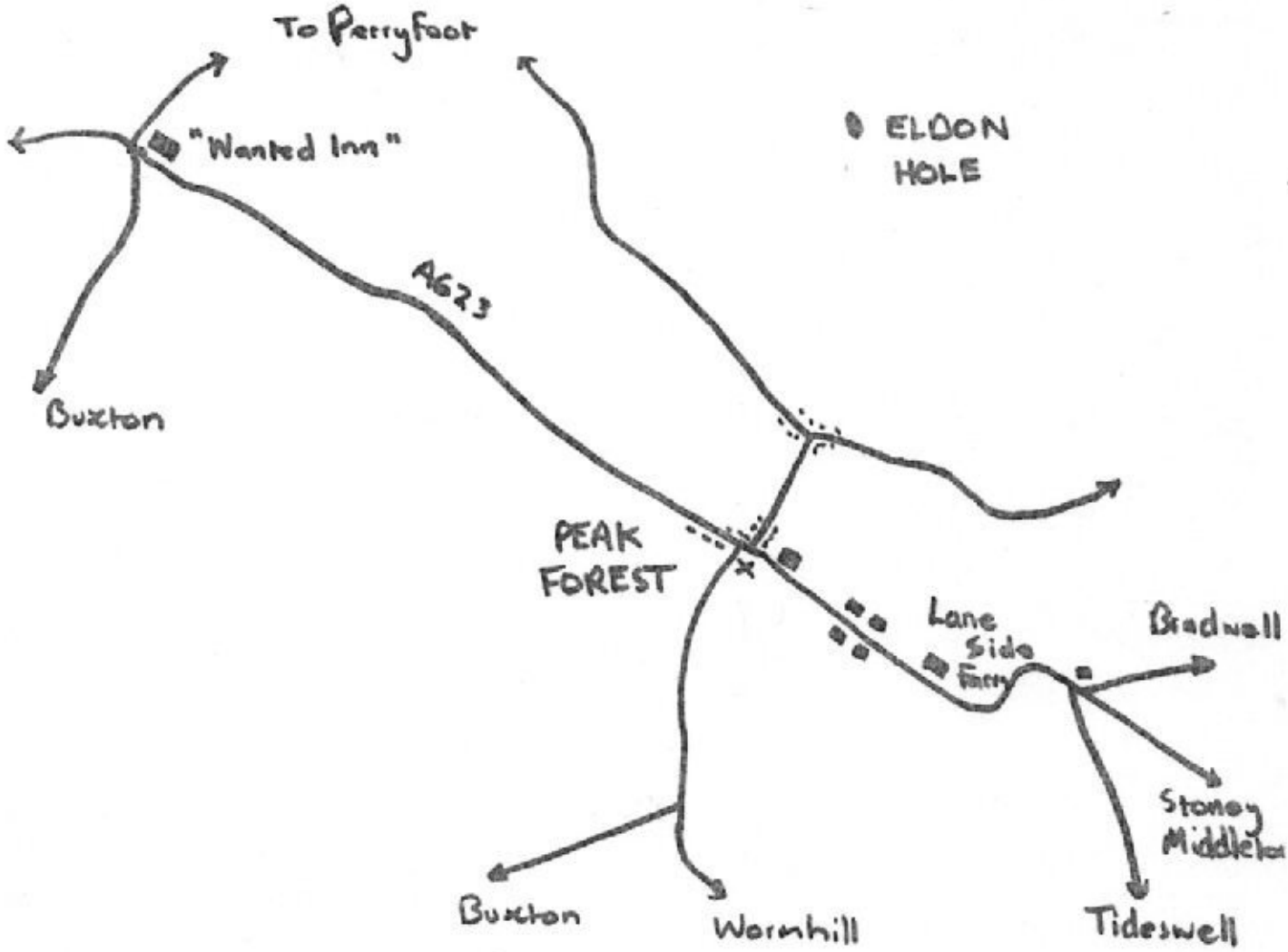
Tackle: 20' ladder and belay OR 30' SRT rope. Cosh. (useful for beginners when bypassing geese.)

Paul S & Ian.

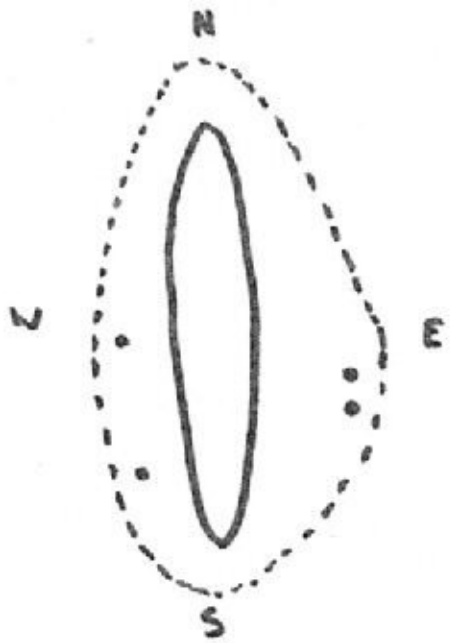
ELDON HOLE ACCESS

Four new belay posts have recently been installed at this site by E.P.C., and a new fence erected by the farmer. The old route down the West side is very loose and should be avoided. The usual route down the West side is 5ft. further to the South, down a gully (bolt in place about 10ft. down) then down to the original twin bolts at 20ft.
Pull through ropes up to Millers Chamber and Damocles Rift are still in situ and working O.K.
The farmer is Bob Furness, Lane Side Farm, Peak Forest. (The last farm on the left going out of Peak Forest.) The hole is now nothing to do with Harry Young at Dogman Slack Farm.

# Eldon Hole, Access Permission.




# ELDON HOLE, BOLT LOCATIONS.



FOR SALE.. TACKLE SACKS LARGE £6.00 (ref. R.J.1) MEDIUM £5.00(REF. T...)
(Ref.R.J.) £2.50 S.R.T.MEDIUM £3.00 (Ref.T.R.2) Allitems with a ref. no. "T..
guarranteed to be incapable of carrying Ralphs camera box !!!

Chest harnesses £3.50, Knee straps 0.50, "8-hour cells complete £11.00 MEMBERS ONLY.

Sweat shirts £7.00, T--Shirts £3.50, Trell leg loops £8.00 SMALL ONLY.

The Latest from Pete TON...C.C.P.C. Hangers.. Left OR right handed !!!! Test figures indicate distortion at 1.25 TONNE, the bolt sheers before the hanger does.

"OFFICIAL MEETS 86"

FEB 8 Nick Pot plus "beginers " to Diccan!! ?

MARCH 1 Long Kin E. Rift. Juniper
" 8 Rescue practice "Derbyshire"
" 16 Peak Cavern plus ...Long Kin West.

May 18 Penyghent
" 31 - JUne1 Hammer- Washfold

28 June FRANCE.....
July 5 GRANGE RIG XMAS
July 16 Belgians AND French arrive

19 July Gaping Gill etc
20 " " " and Lancaster- Top Sink
" SOUTH WALES.
AUGUST FRANCE SEE LIAM.
30 " Gingling

Sept. 20 Magnetometer

Oct 18 Lost Johns plus all Leck Fell

Nov 15 Dale Head
" 23 Lancaster Pip. etc

These represent only a fraction of what realy takes place.. ring around, come to meetings, its realy up to you...

CLUB "XMAS" DO 22MARCH "OUT OF TOWN" £4 aprox. DISCO. BUFFET INC.

STOP PRESS.. OTTER HOLE AUGUST 2nd and AUGUST 24 th

AMMENDMENTS TO MEMBERS LIST

Chris Daniels Redacted

Andy Martin Redacted

Martin Soliman Redacted

** Caroline Byrne Redacted

** John Gillett work Redacted